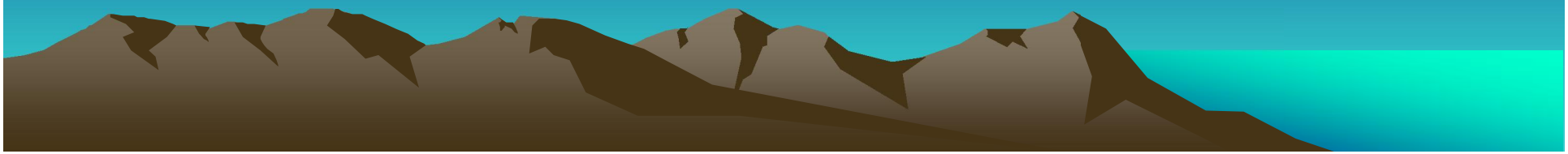

Welcome

Meeting Agenda

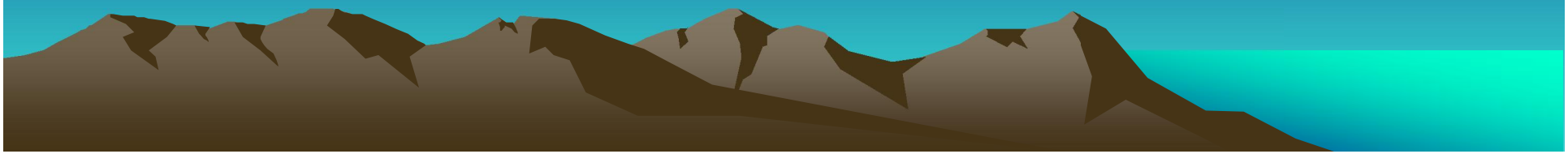
- Welcome and Introductions
- Particulate Matter – a Retrospective
- PM2.5 - National Ambient Air Quality Standards
- Utah's Nonattainment Areas
- State Implementation Plan
- Ozone
- Project Organization
- Communications
- Next Steps



Particulate Matter

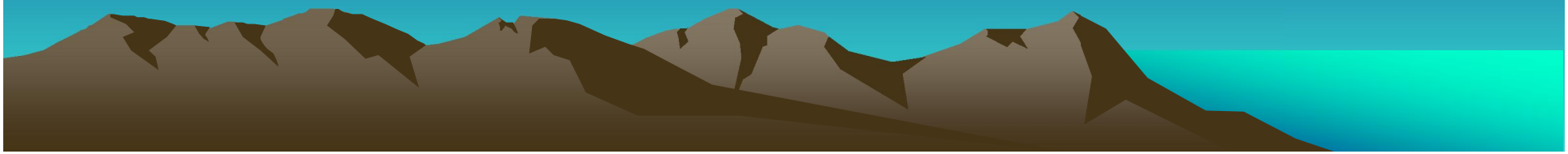
Particulate Matter in Utah

- In December of 2006, EPA Revised the NAAQS for Particulate Matter
- This marks the latest step in a long history of PM regulation
- Here's a Quick Recap of PM Regulation in Utah



Total Suspended Particulate

- We started with Total Suspended Particulate Matter (TSP)
- CAA of 1977 identified four counties as nonattainment for TSP (Utah, S.L., Davis, and Weber)
- By 1983 Davis and Weber Counties were re-designated to attainment
- Utah did have a SIP for TSP
  - Included limits for seven sources

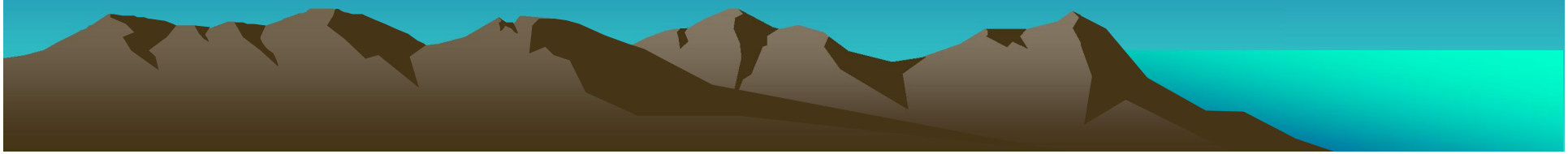


PM10

- In 1987 TSP was Replaced by PM10
- The 24-hr Standard was set at 150 $\mu g/m^3$
  - Allowing one exceedance per year
  - Over a 3-year average
- The Annual Standard was set at 50 $\mu g/m^3$
  - Over a 3-year average

PM10

- Monitoring data revealed the following about PM10
  - Utah was boarder-line for the annual standard
  - But, we violated the 24-hr standard by a wide margin
  - Our exceedances were seasonal and weather dependant



PM10

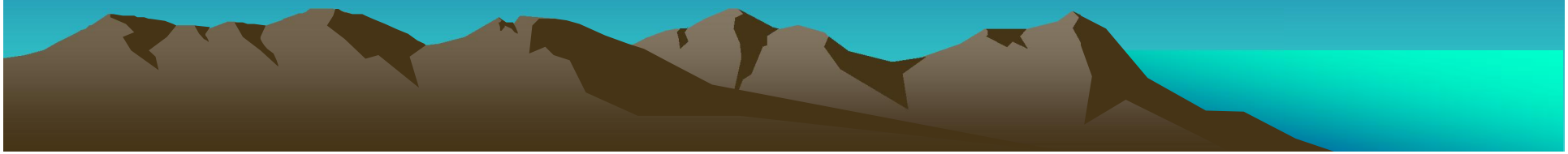
In 1991 DAQ wrote SIPs to address PM10

Here were the Design Values back then…

- Utah County
  - Lindon 254 $\mu g/m^3$
  - North Provo 191 $\mu g/m^3$
  - West Orem 263 $\mu g/m^3$
- Salt Lake County
  - Air Monitoring Center 177 $\mu g/m^3$
  - North Salt Lake 169 $\mu g/m^3$
  - Salt Lake City 170 $\mu g/m^3$

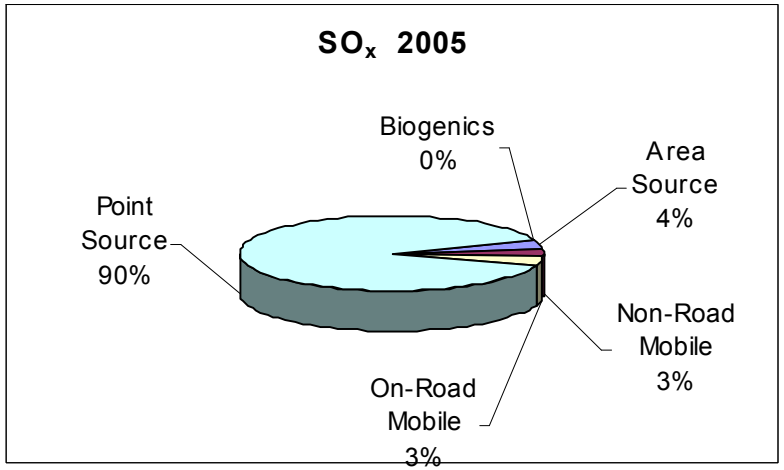
PM10

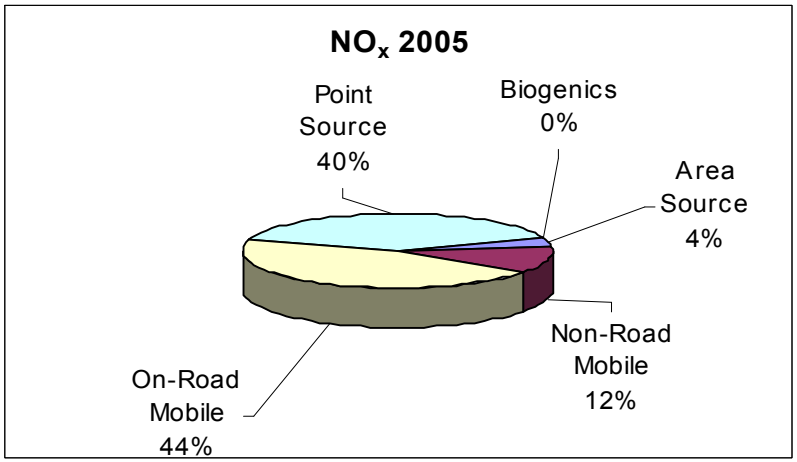
- Most of the PM10 collected on the filters was Secondary Particulate Matter
- Most Secondary PM is small enough to also be considered PM2.5



Secondary PM

- Not emitted from the source as a particle
- Rather, gasses called precursors are emitted from the source
- These precursors react in the atmosphere to form particles later on
  - Ammonium Sulfate
  - Ammonium Nitrate





PM10 Control Strategies

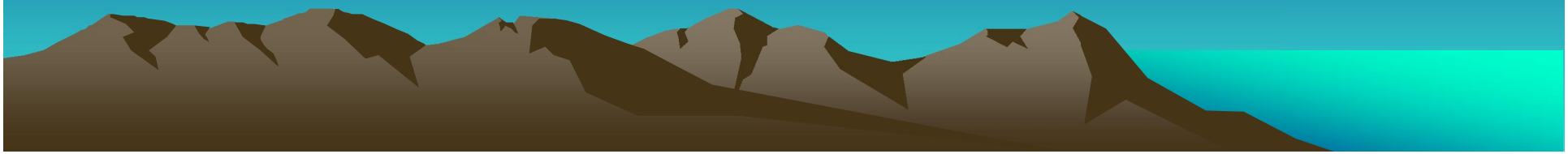
- Control strategies in the 1991 SIPs were comprehensive
  - Included Point, Area and Mobile Sources
  - Made Secondary Precursors much of the focus (often > 60% of the filter mass)
- Here were some of the highlights…

PM10 Control Strategies

- **SIP Limits on 72 Industrial Point Sources (SO_2, NO_x, PM10)**
  - Sulfur Recovery Units on 4 Refineries and Geneva Steel (Coke Oven Gas)
  - Low-Sox Catalyst for Refineries
  - Smelter modernization and double contact acid plant at KUC
  - Sulfur scrubbing at Sinter Plant and Interstate Brick
  - Nitric Acid Plants at La Roche
  - Fuel Switching at large Coal-Fired Boilers
  - Low-NO_x Burners
  - Baghouses at Sinter Plant and BYU Heating Plant
  - Aggregate Industries – Coarse Particulate

PM10 Control Strategies

- Woodburning Program ("Red Burn")
  - Impact from woodsmoke on design days ranged from 12 – 52 $\mu g/m^3$
  - Impact from woodsmoke on design days averaged 25 – 40 $\mu g/m^3$
- Program effectiveness of 80 to 90 %
- Woodsmoke is fine particulate



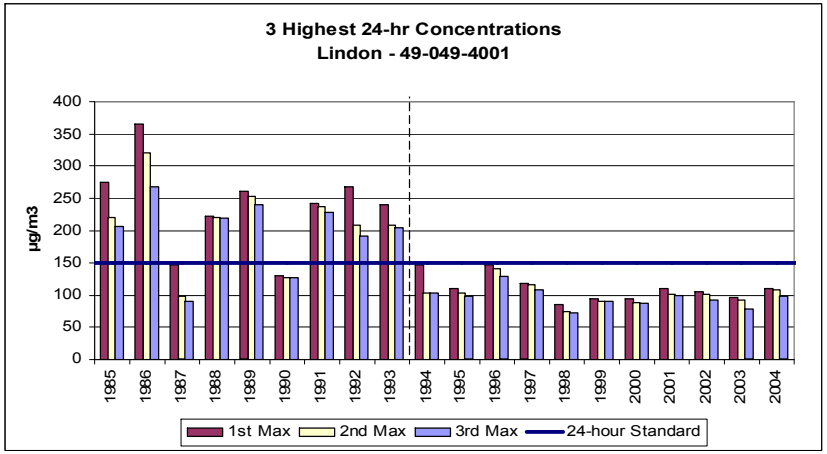
PM10 Control Strategies

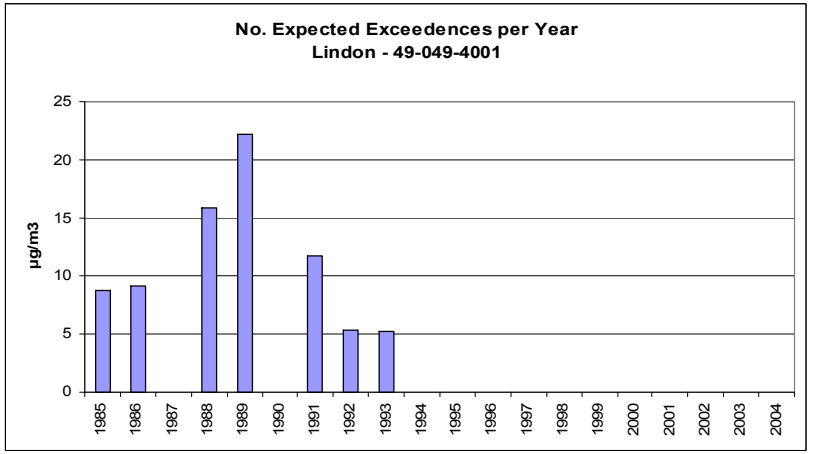
- Mobile Sources
  - Tailpipe Emissions decreased through federal oversight… particularly with respect to NO_x
    - Introduction of Tier I Vehicles in 1994
    - 60% reduction in the NO_X cut-point
  - Implemented a Diesel I/M program

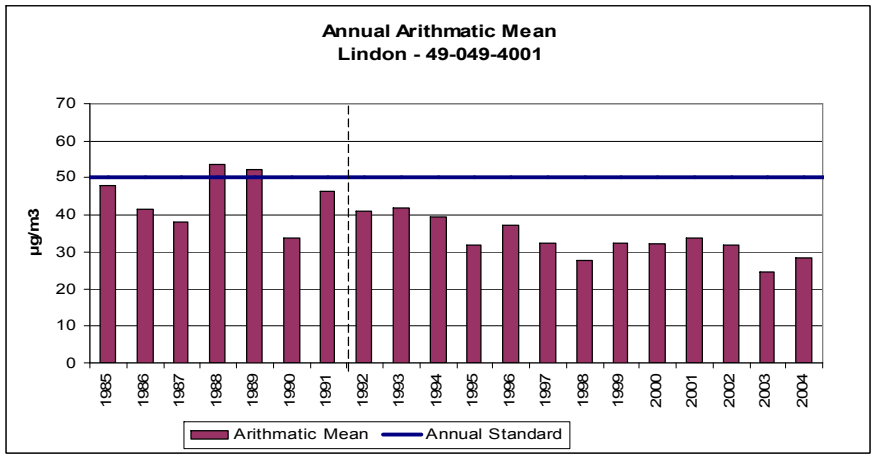
PM10 Control Strategies

- So how did it all work out?
  - Attainment date was the end of 1994 (’96 really)
  - We made it in both counties, with a year to spare in Salt Lake County
- And we’ve done pretty well in maintaining the progress that was made
  - Even requested that EPA re-designate us to attainment

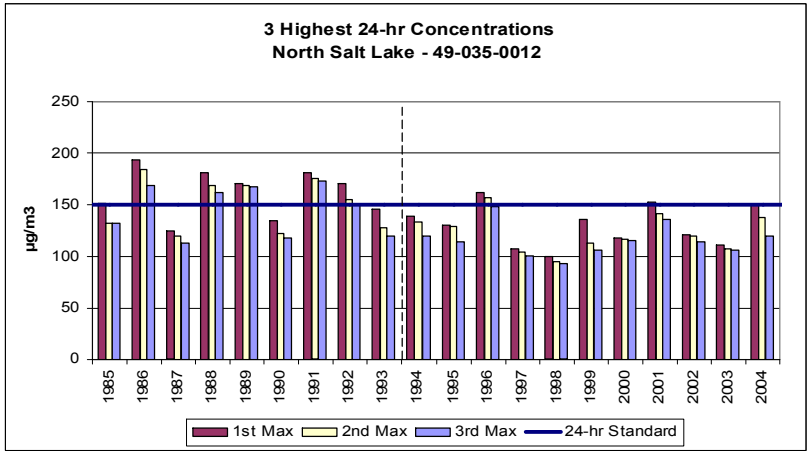
PM10 Trends: Utah County

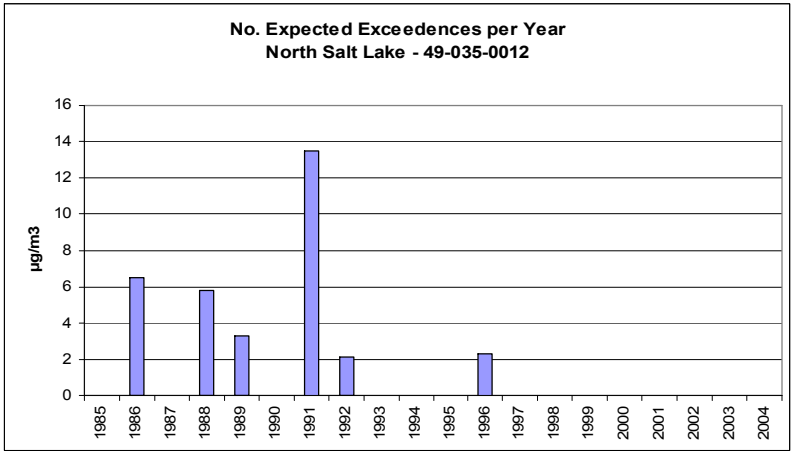


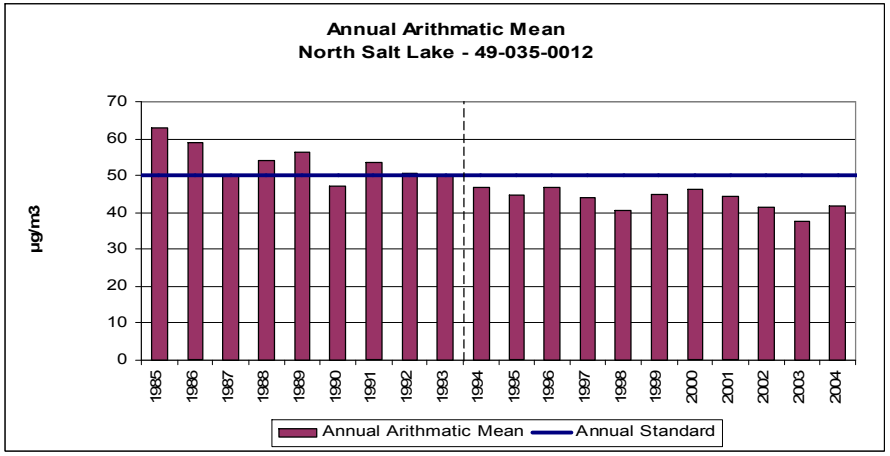




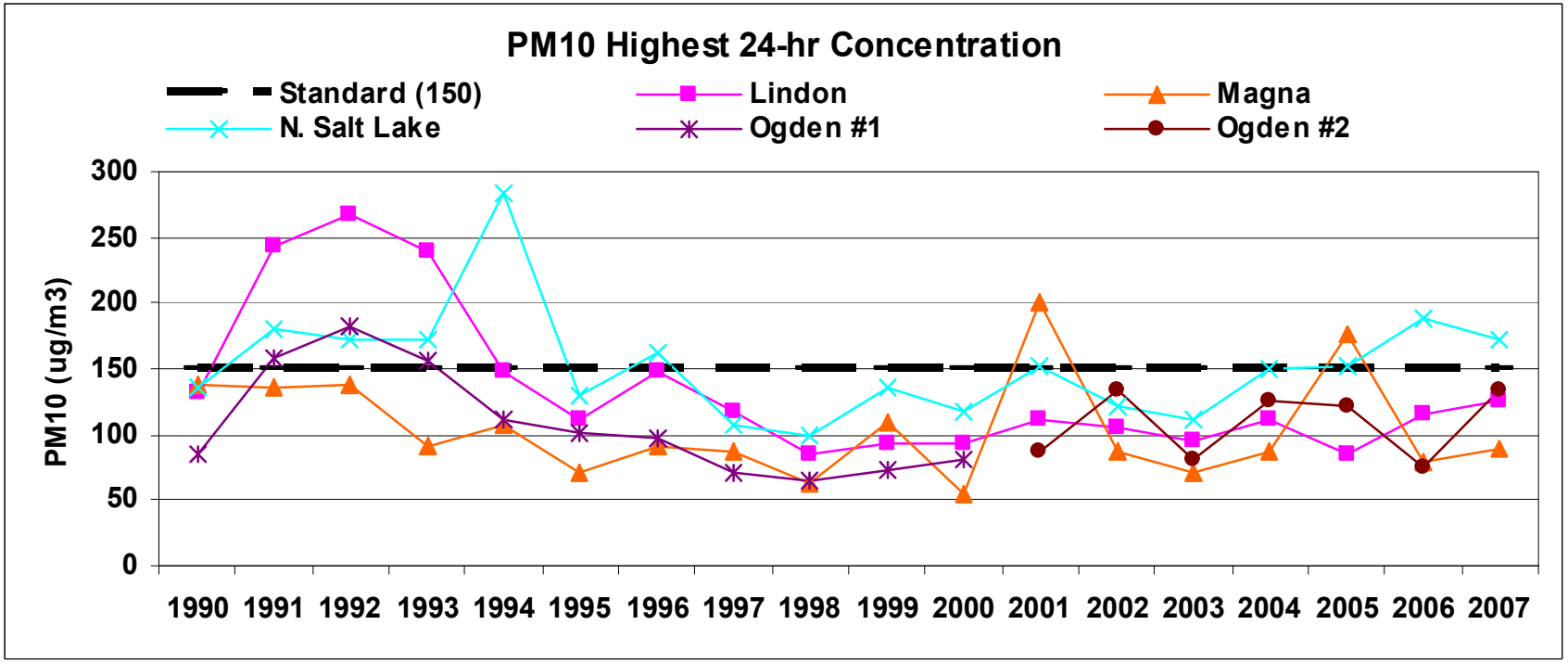
PM10 Trends: Salt Lake County



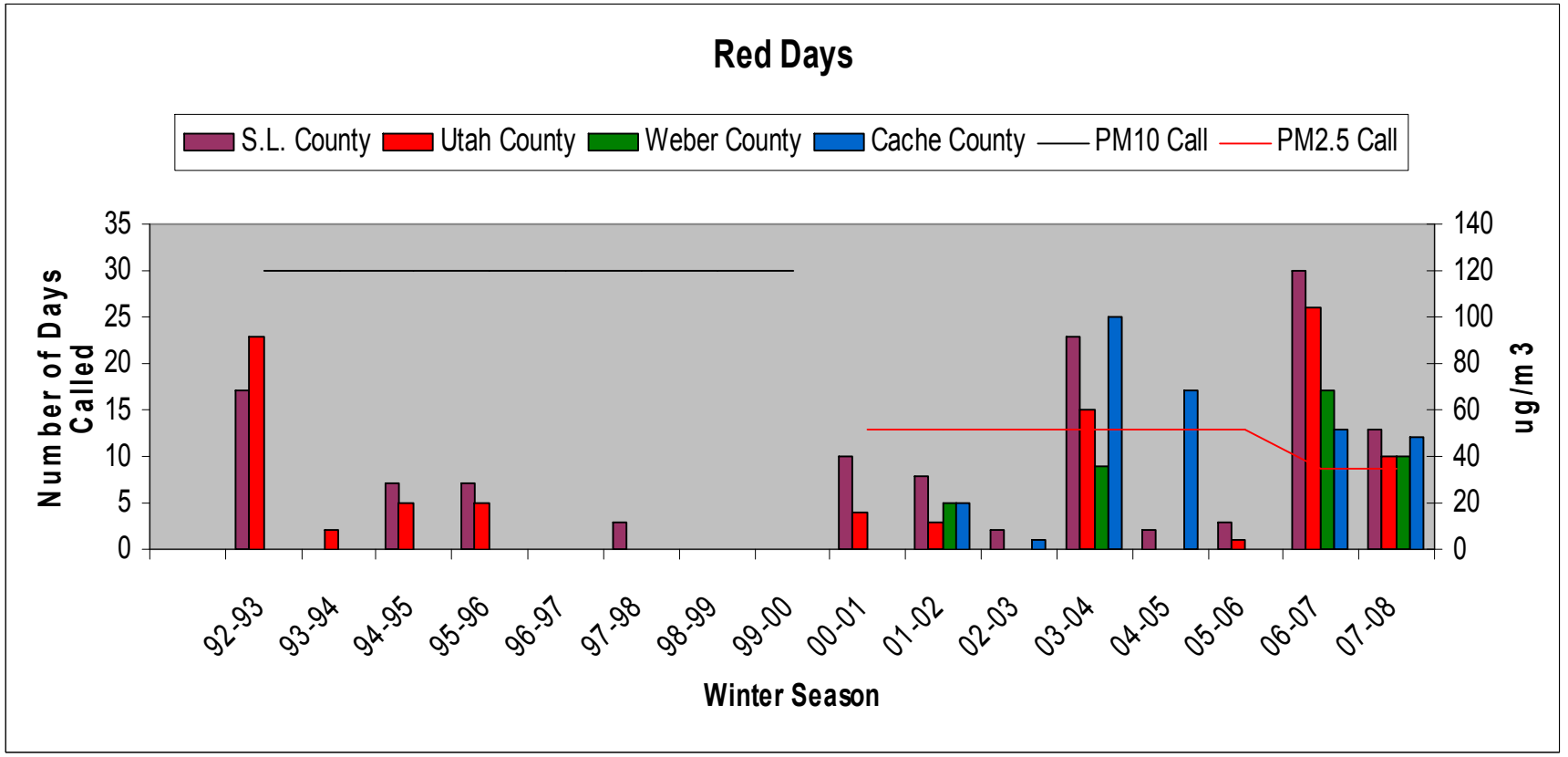




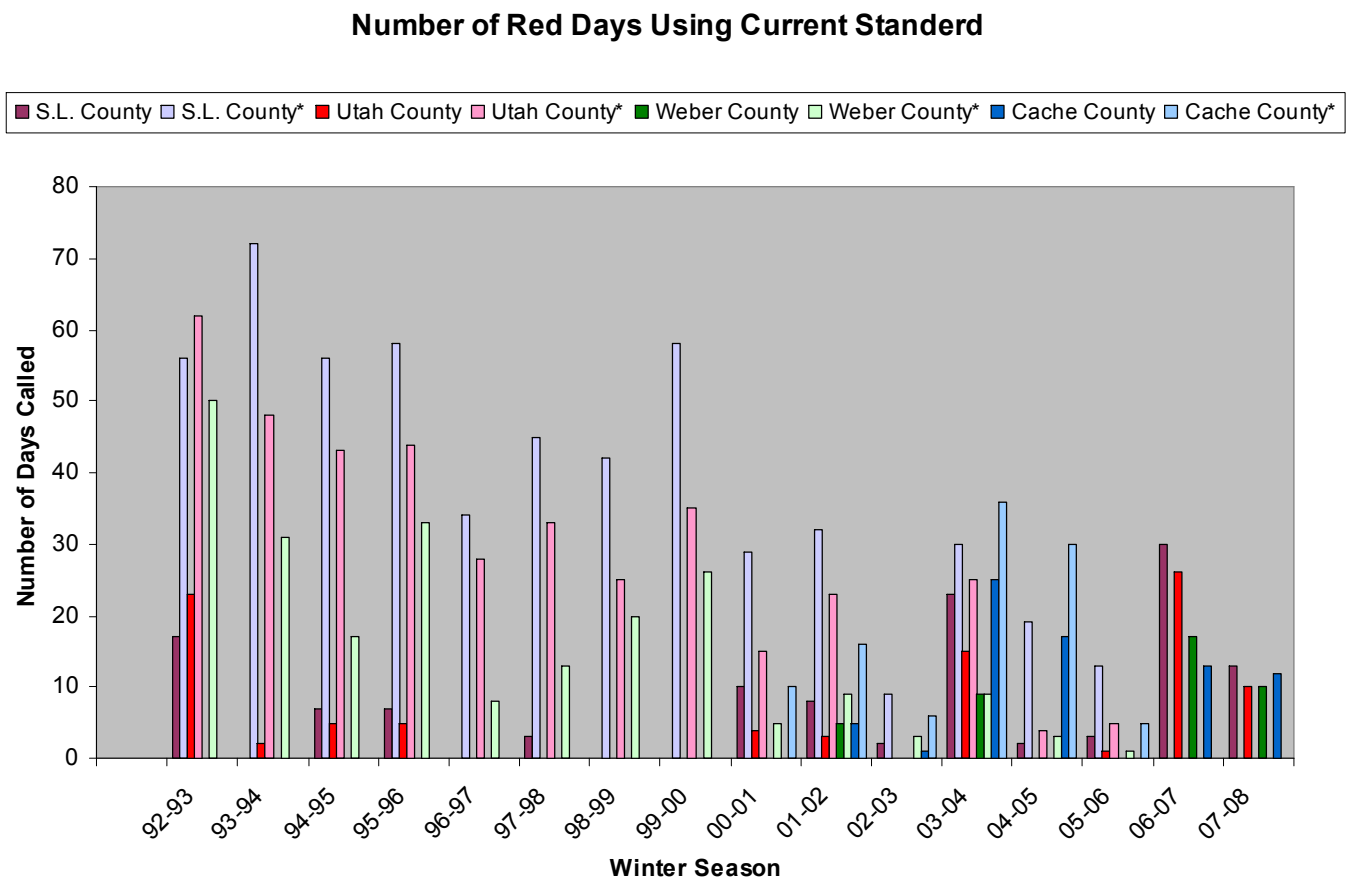
PM10 Trends


PM10 Highest 24-hr Concentration
Standard (150)
Lindon
Magna
N. Salt Lake
Ogden #1
Ogden #2
PM10 (ug/m3)
300
250
200
150
100
50
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

But the Number of Red Days is Increasing. Does this Mean the Air is Getting Worse?



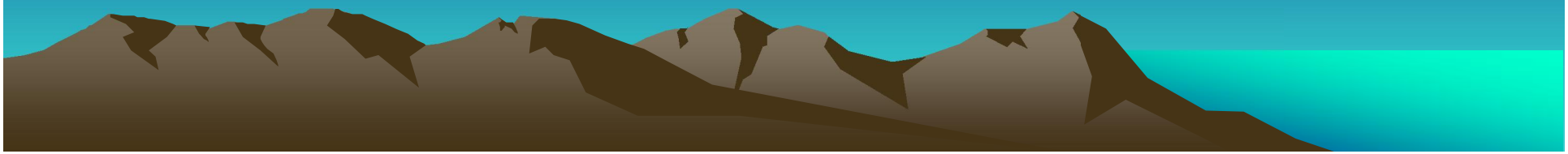
Here's How the Trend Chart Might Have Looked



- * Number of red-burn days there would have been using the current standard.
- Pre winter of 2000-2001 Pm2.5 is calculated using 80% of PM10 measured value

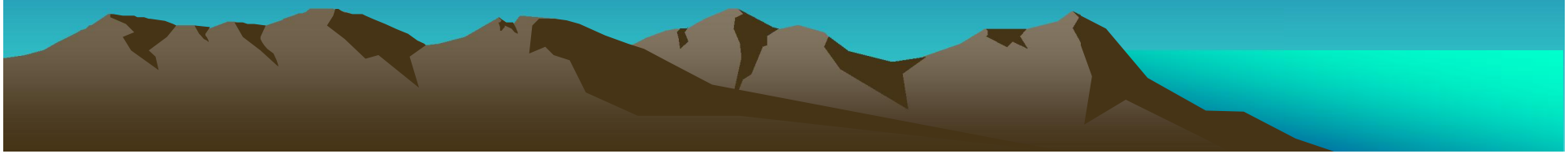
A New Indicator: PM2.5

- PM10 was bi-modal in size distribution
  - Health studies were concerned about the smaller “fine” fraction
- In 1997 EPA introduced standards for PM2.5
  - Annual Standard of 15 $\mu g/m^3$ (3-yr avg. of annual means)
  - 24-hr Standard of 65 $\mu g/m^3$ (3-yr avg. of 98^{th} %ile values)
- Retained PM10 standards to represent the “coarse” fraction

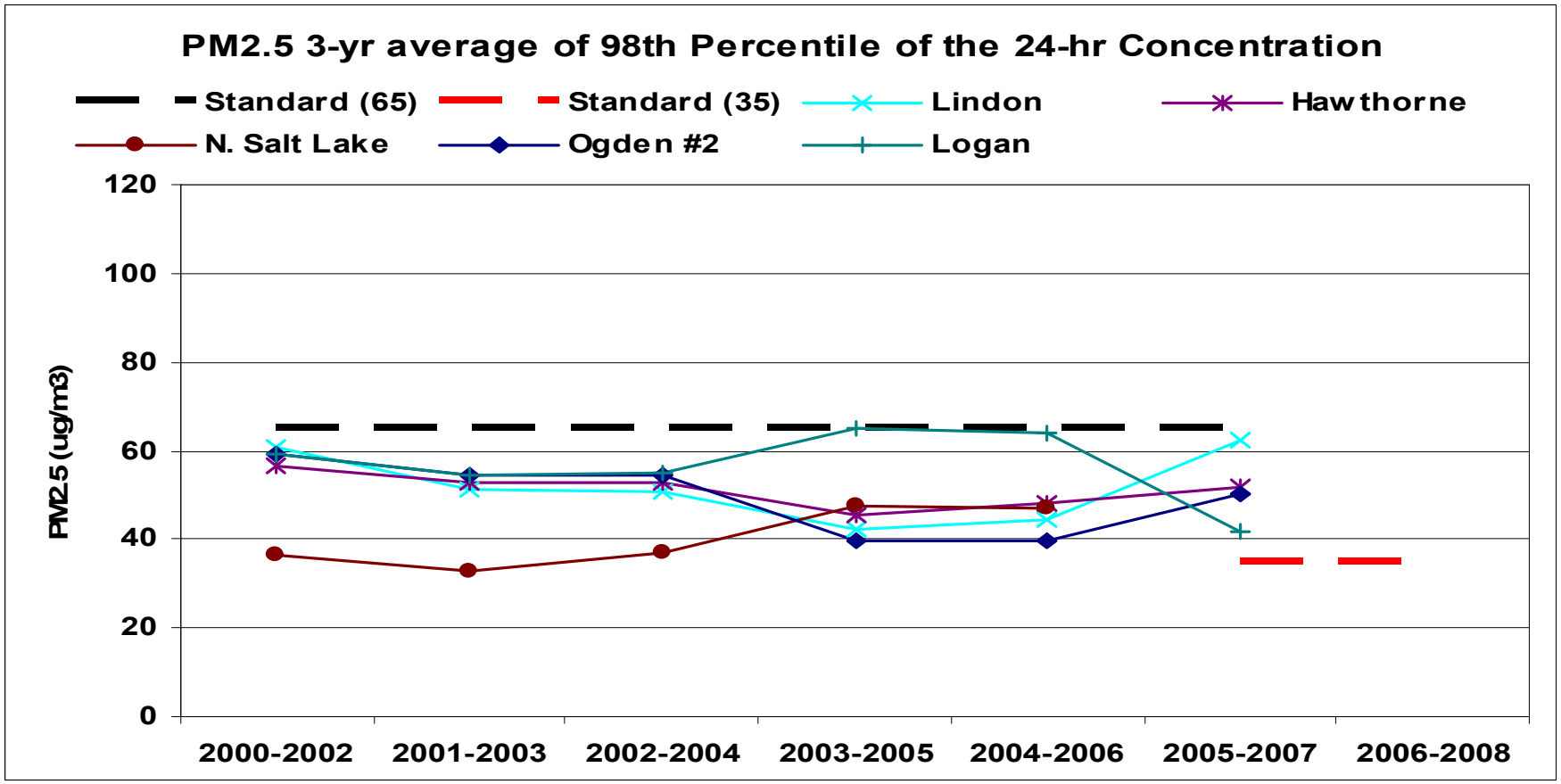


PM2.5

- How are we doing with respect to the 1997 standards?
- All areas of the state were designated as Attainment
  - We did not violate either standard
  - Although we came pretty close to the 24-hr standard (two 63's and a 64 at Logan)
- We've not had to write a plan…. YET anyway

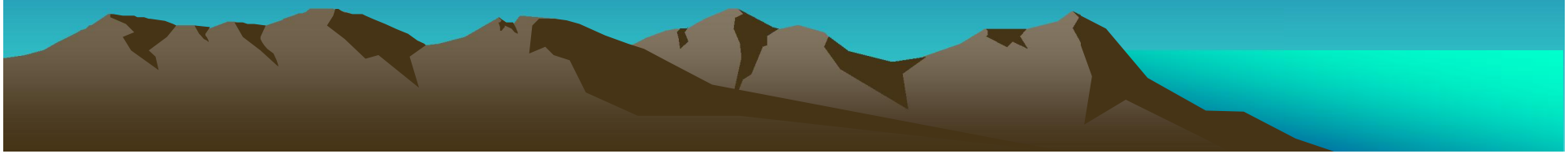


PM2.5 Compliance With 1997 NAAQS



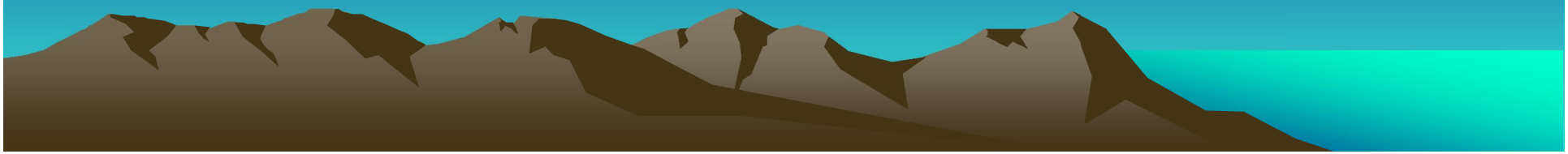
Revised NAAQS for PM2.5

- EPA revised the NAAQS for PM2.5 in December of 2006
  - 24-hr standard was lowered from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$
  - Annual standard was retained at 15 $\mu g/m^3$
  - Retained the 24-hr standard for PM10 at 150 $\mu g/m^3$

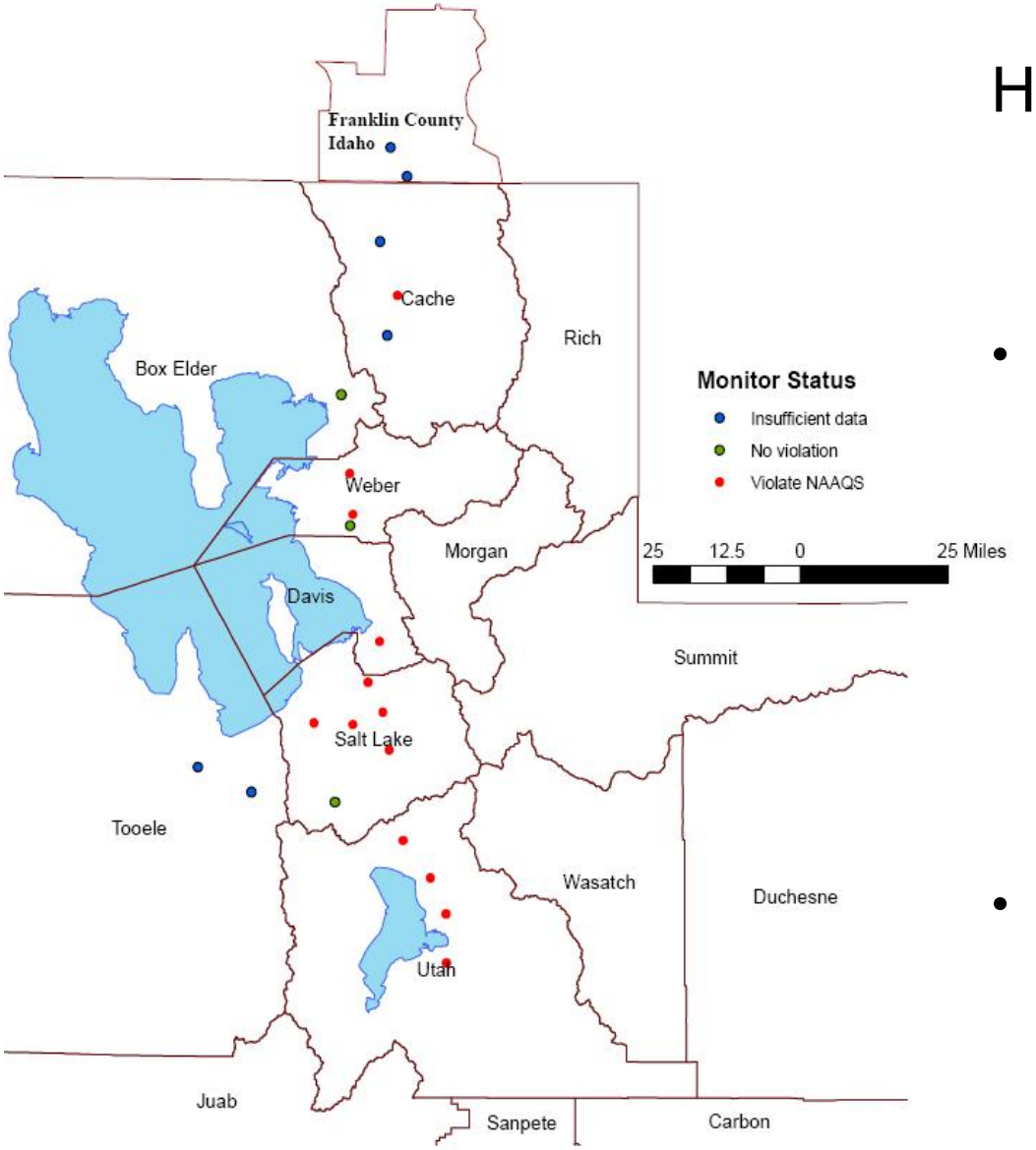


Utah's PM2.5 Nonattainment Areas

- The Clean Air Act establishes that Areas may be Designated as:
  - **Attainment** - for any area that meets the standard for the pollutant
  - **Nonattainment** - for any area that does not meet the standard or that contributes to a violation in a nearby area
  - **Unclassifiable** – for any area that cannot be classified based on available information
- States may Recommend Area Boundaries to EPA

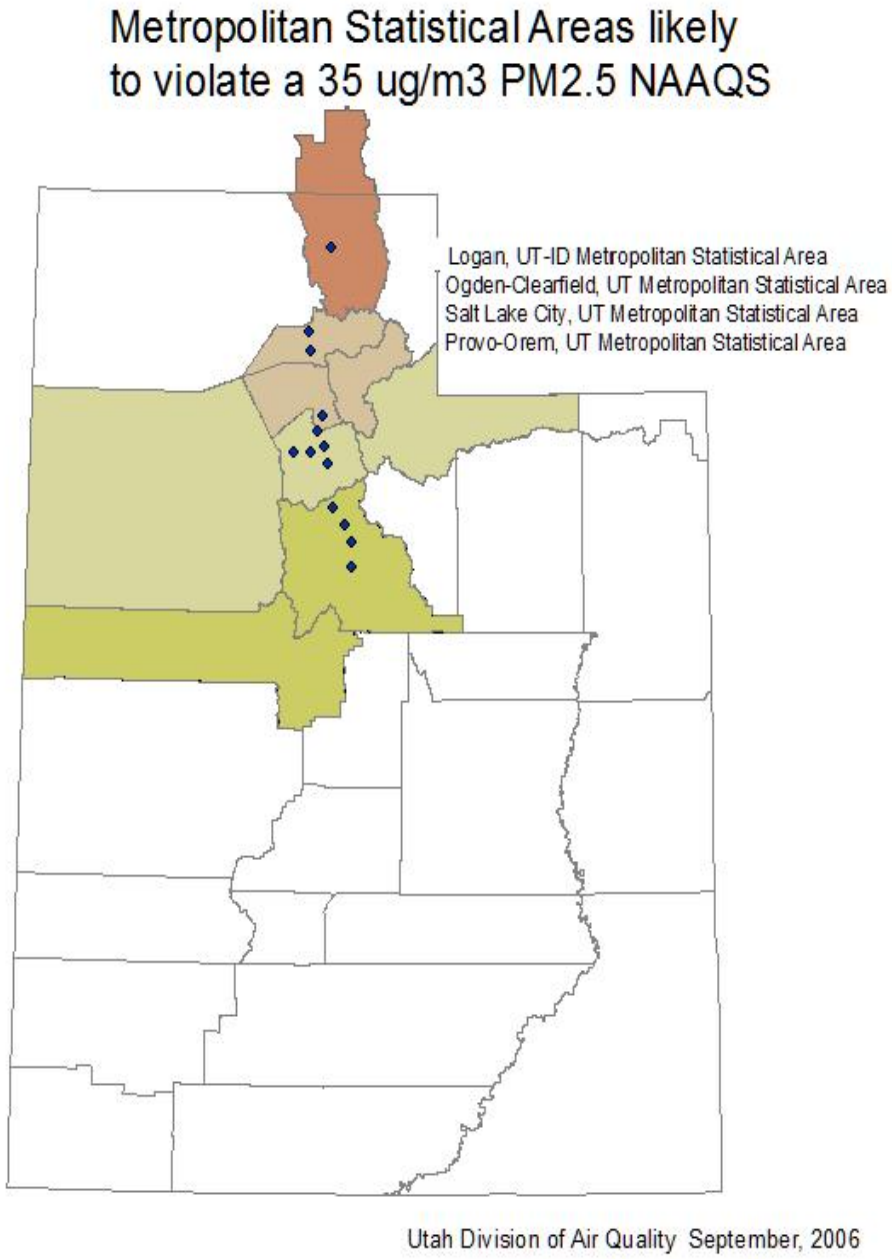


Utah's Air Monitoring Network



Here is a map of Utah's PM2.5 air monitoring network

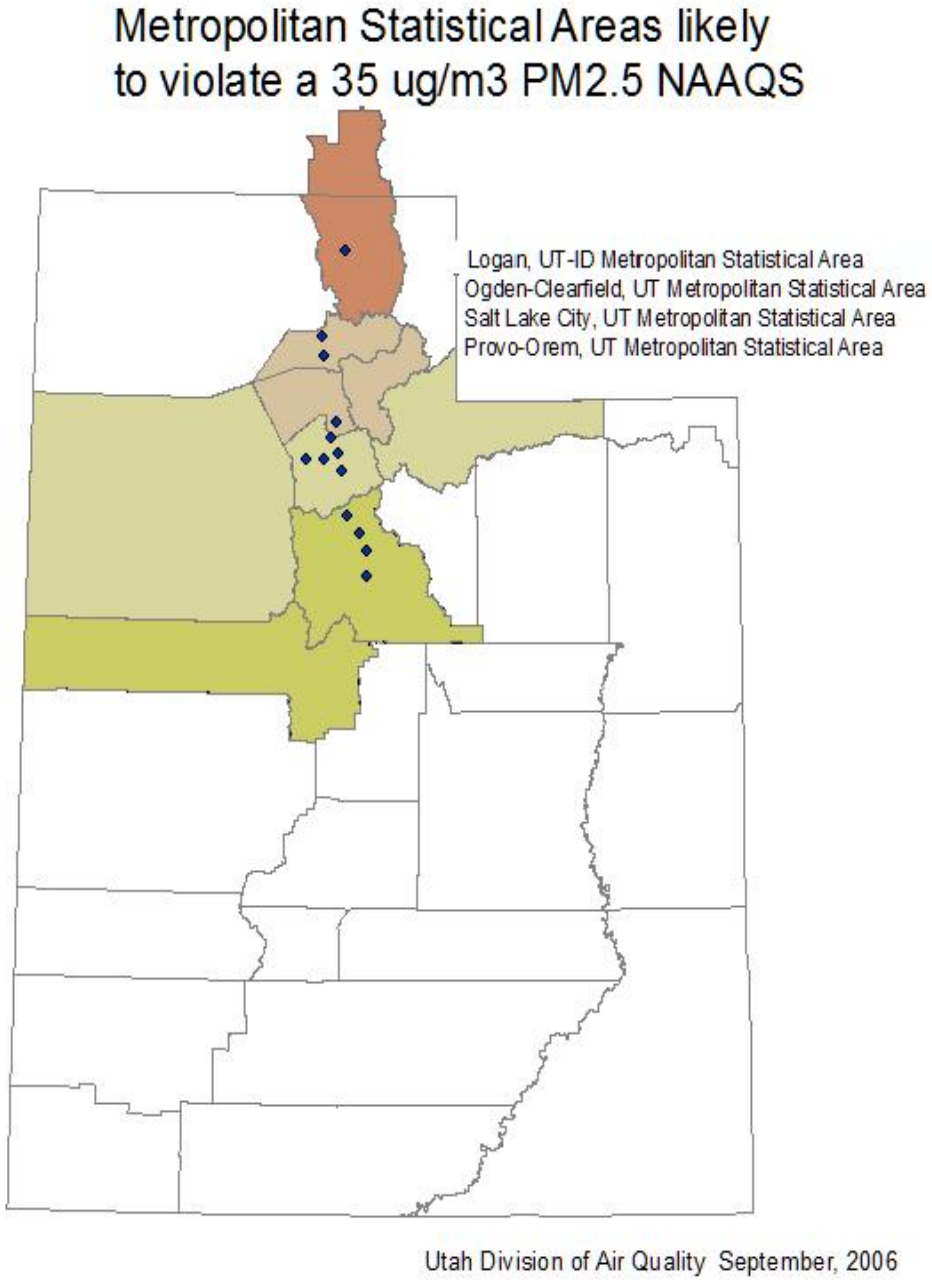
- Dots are colored to indicate compliance or noncompliance with the NAAQS:
  - **red** means not attaining
  - **green** means attaining
  - **blue** means not enough data yet
- All instances of noncompliance are related to the 24-hr design values



Presumptive Boundaries

- **For urban nonattainment areas** violating the annual standard, the area boundaries should be based on Metropolitan Area (MA) boundaries.

- **For rural nonattainment areas**, EPA would presume that the entire county in which a violation was determined should be designated nonattainment.

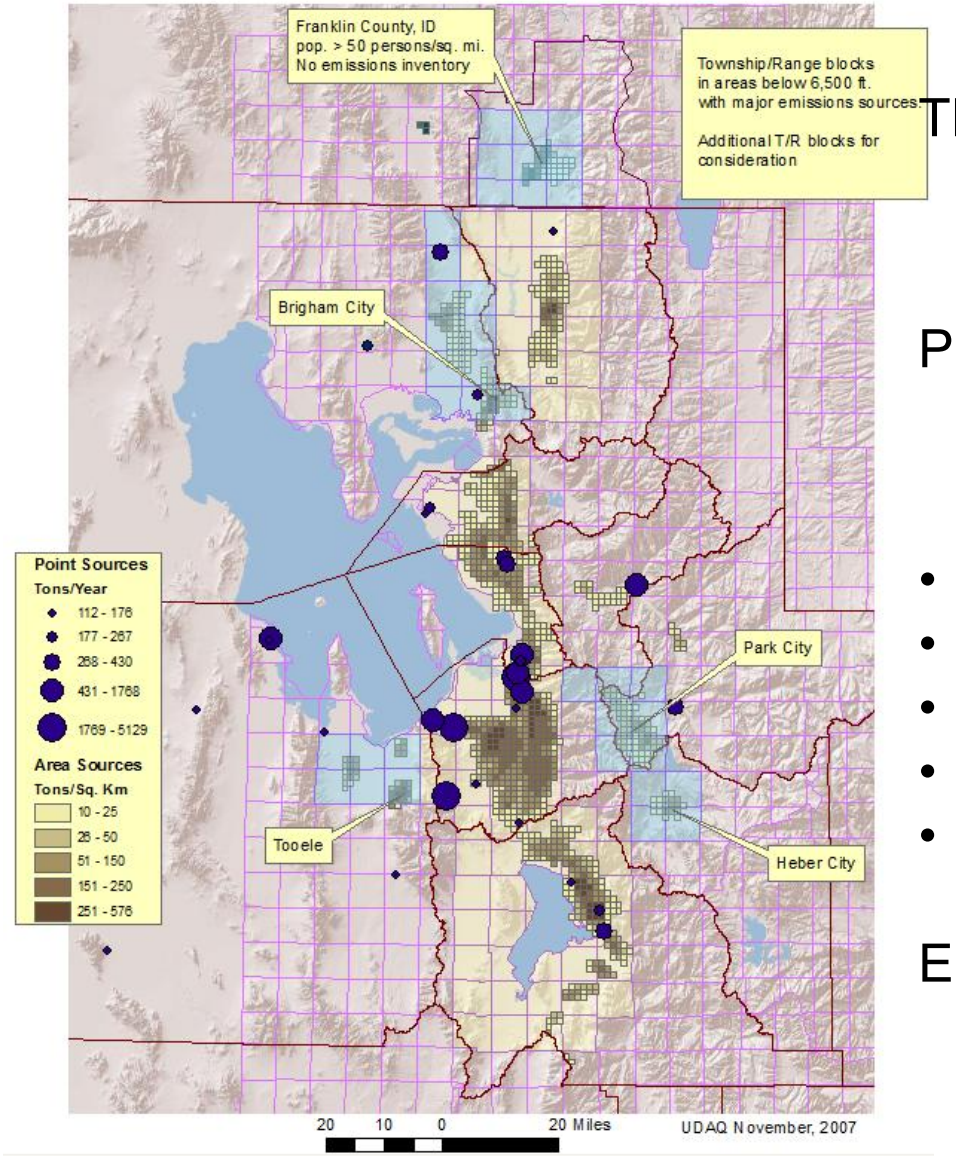


Alternative Boundaries for areas not violating the annual standard

Must Consider 9 Factors:

1. **Emissions**
2. **Air Quality**
3. **Population density**
4. **Traffic**
5. **Expected growth**
6. **Meteorology**
7. **Geography/Topography**
8. **Jurisdictional boundaries**
9. **Level of control of emission sources**

Utah's Assessment of the 9 Factors

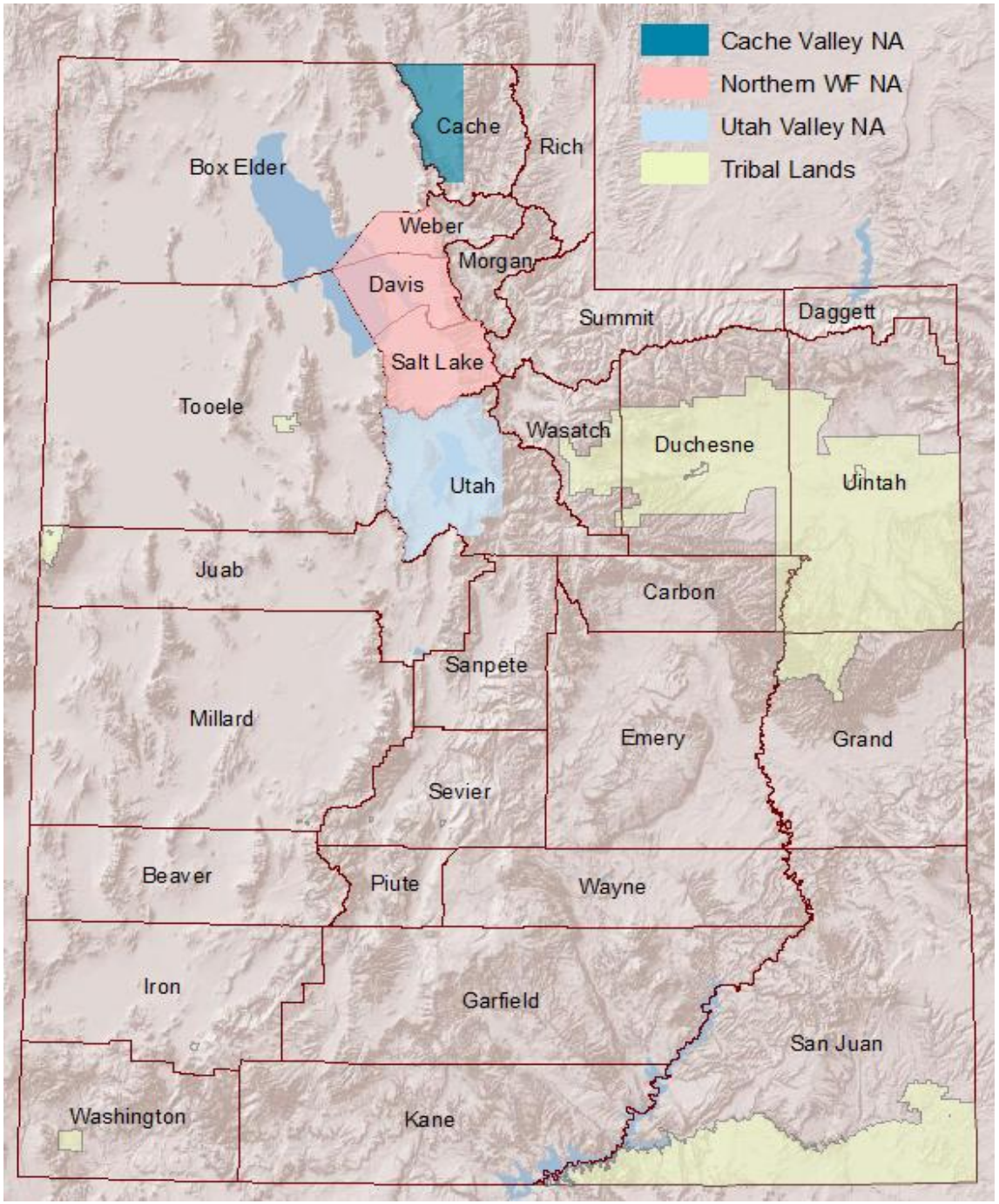


This map shows the core nonattainment Townships (Yellow)

Plus some additional townships that might be included in the nonattainment areas (Blue)

- Tooele
- Brigham City
- Franklin County, Idaho
- Heber City
- Park City

Emissions are shown as an overlay



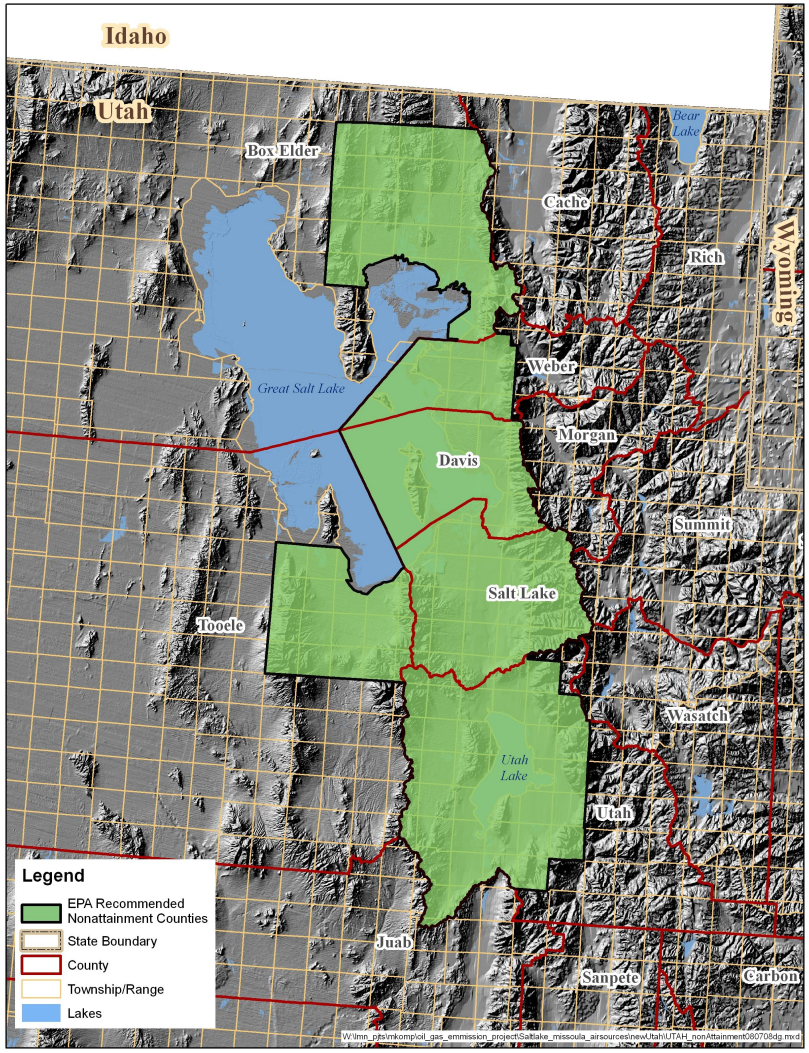
Governor's Recommendation for Nonattainment Areas

All other areas were recommended as

- attainment or
- unclassifiable

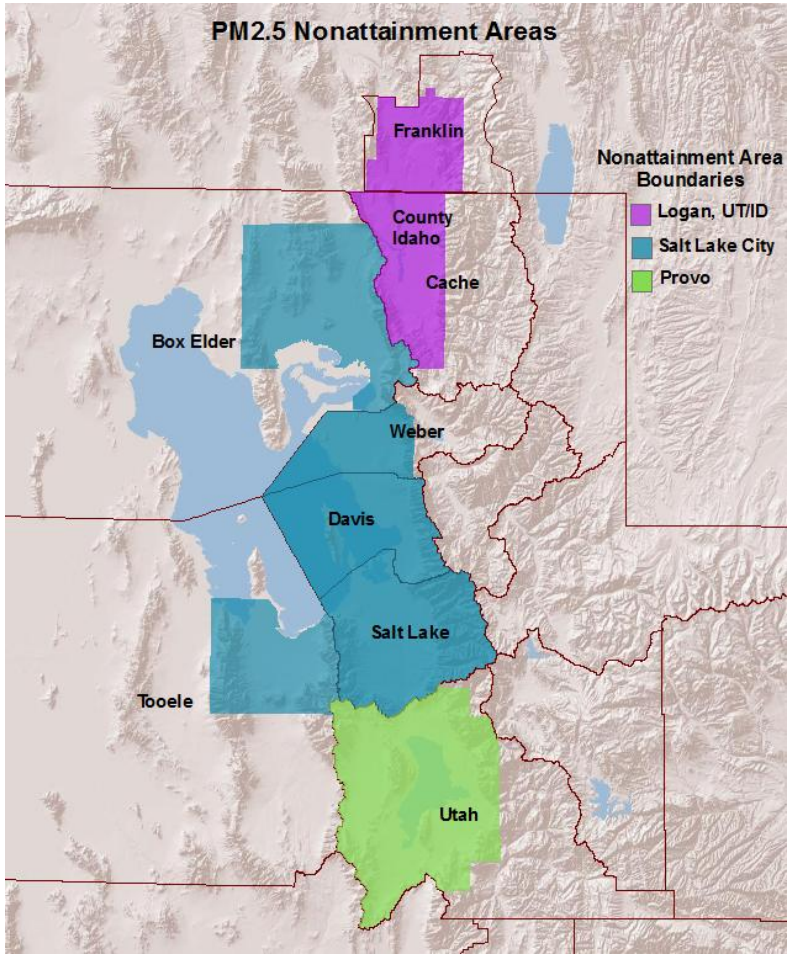
States do not make recommendations concerning Tribal Lands

EPA Proposed its Designations in August of 2008



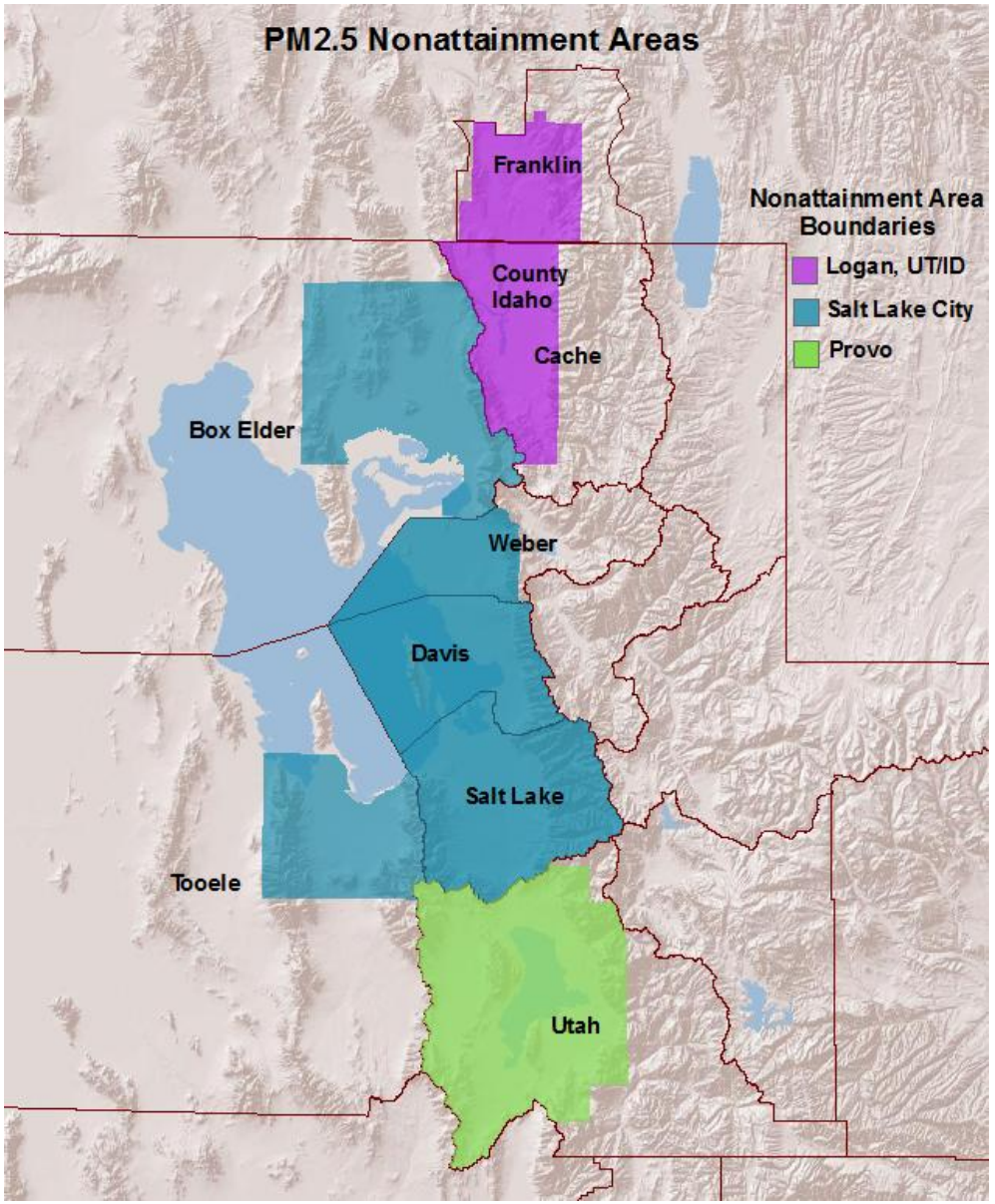
EPA's Final Determination

- EPA considered comments taken on its August 18th Proposal
- Announced its decision by letter of December 22, 2008



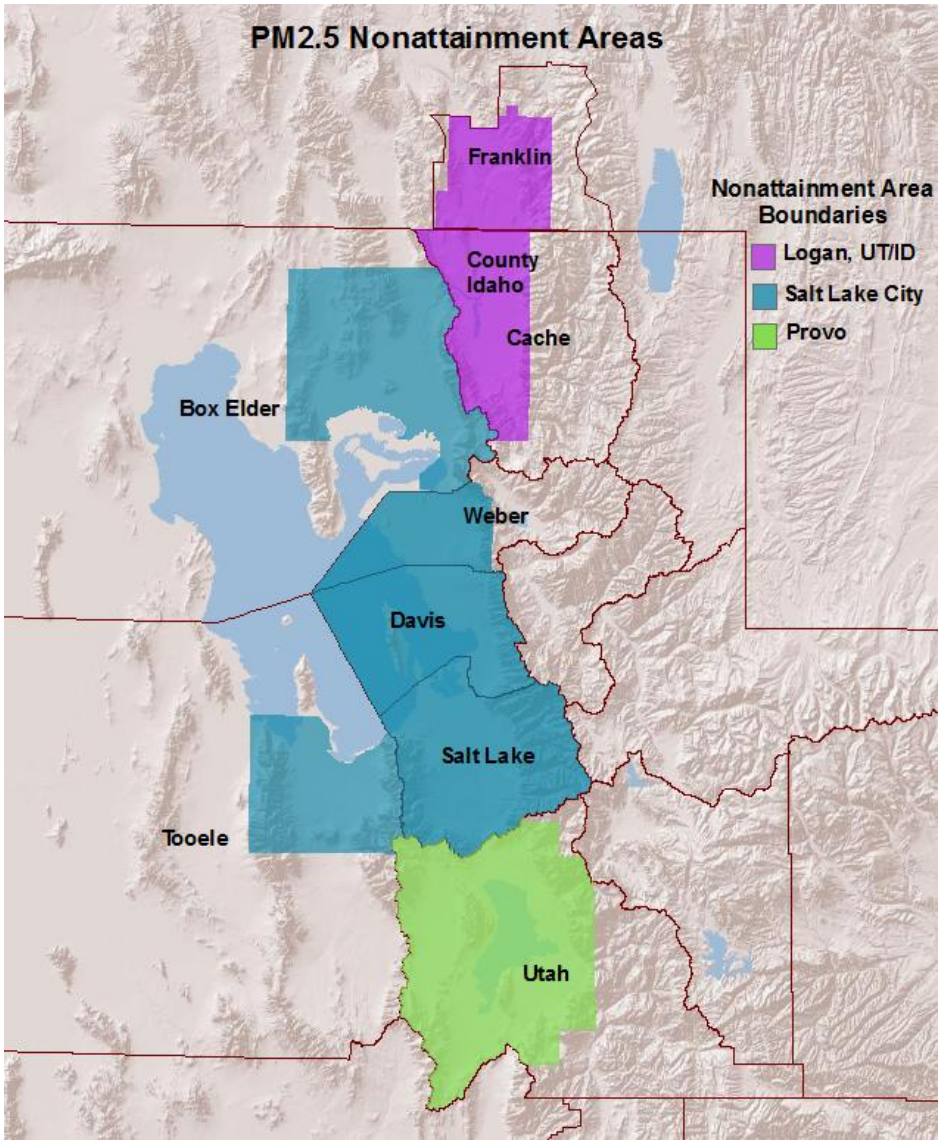
EPA's Final Determination

- It differs from their proposal
  - in the separation of Utah County
- It differs from Utah's proposal
  - with the inclusion of Tooele and Box Elder Counties (portions)
  - and the inclusion of Idaho's portion of the Cache Valley



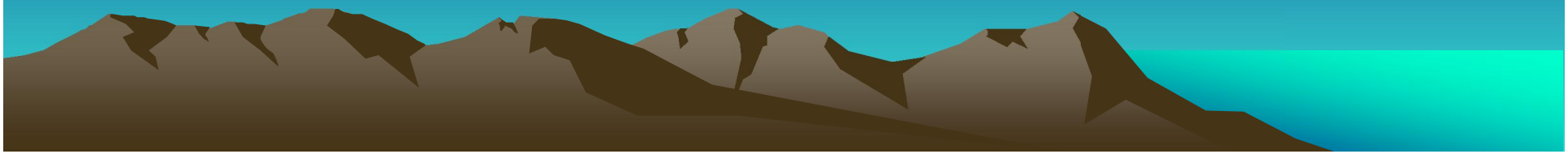
EPA's Final Determination

- Designations still have not been published in the federal Register
  - With an Effective Date
- The Effective Date starts all relevant clocks
  - Due Date for SIPs (3 years from effective date)
  - Implementation Dates for Controls (1 year after SIP)
  - Attainment Dates for Areas (2 - 7 years after SIP)



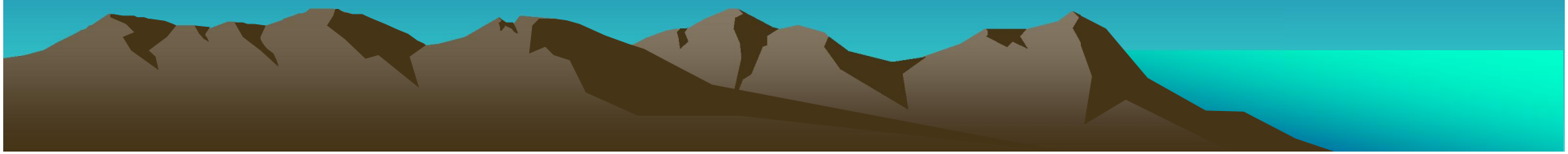
State Implementation Plan

- Basic Elements include:
  - Modeled Attainment Demonstration (with chemistry)
  - Emissions Inventories
  - Emission Limits
    - Controls on Point and Area Sources
    - RACT / RACM at a Minimum
    - Transportation Conformity Budgets
  - Attainment Dates (2 – 7 years after SIP)
  - Contingency Measures
- Additional Considerations:
  - Reasonable Further Progress (RFP; possibly)
  - Condensable Emissions



State Implementation Plan

- Essentially a 3-year process for any pollutant
- Basic Project Phases include:
  - **Model Validation**
    - Includes Episode Selection, Inventories, Meteorological Data
  - **Control Strategy Testing / Development**
    - Sensitivity runs to Identify Targets
    - Identification of Possible Controls
    - Projection Inventories are tested in the model
  - **Administrative**
    - SIP writing & processing
    - Emission Limits
    - Technical Documentation
    - Associated Rulemakings

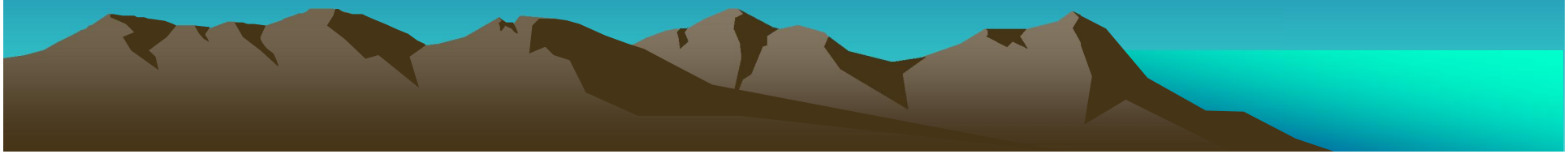


Ozone?

- EPA Revised the Ozone NAAQS in March of 2008
  - Lowered the standard from 0.084 ppm to 0.075 ppm
- DAQ will need to develop Ozone SIPs for areas of the state that do not meet the new standard
  - Starts the same set of clocks we have for PM2.5

Schedule for Ozone Area Designation Process

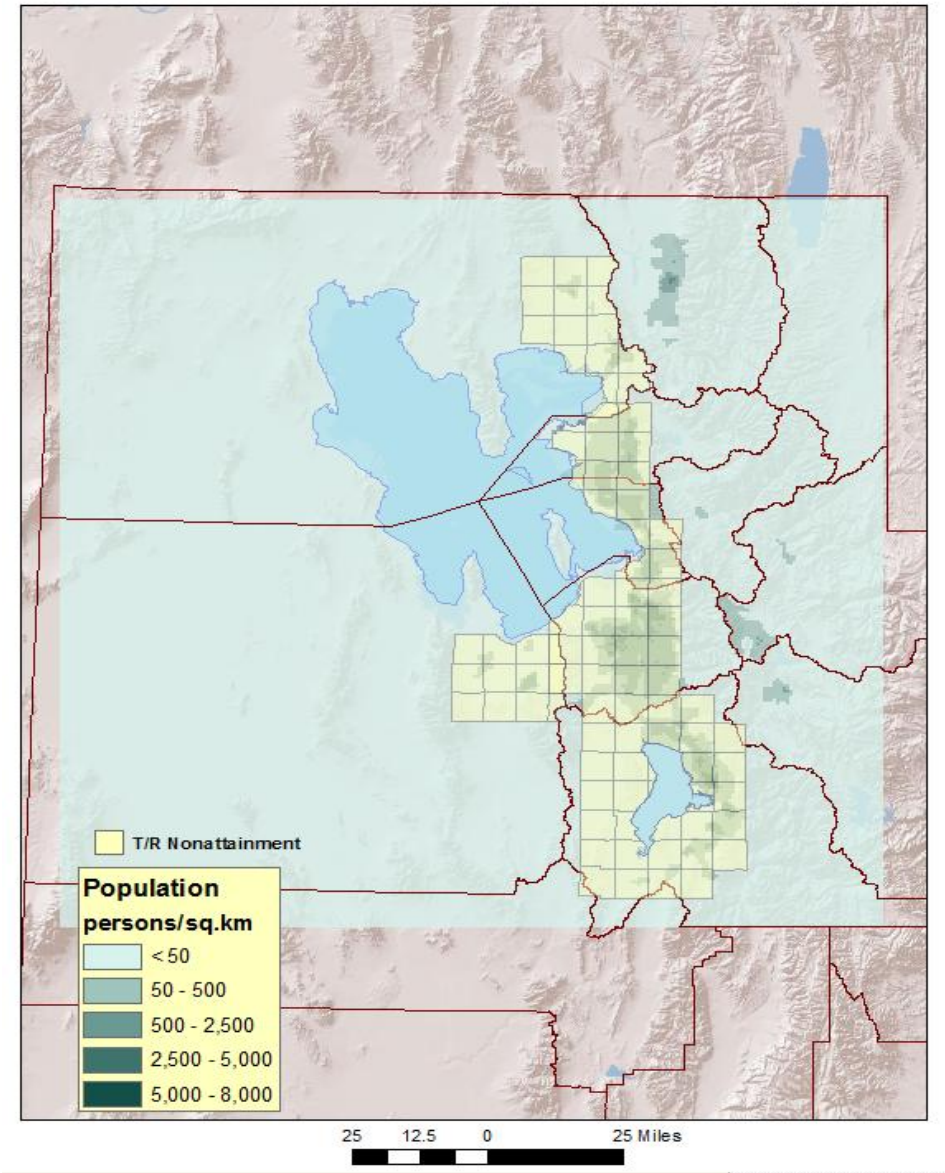
- DAQ will Recommend Area Boundaries to EPA in March of this year (2009)
- EPA will make the Area Boundaries Final in March of 2010
- State Implementation Plans are Due three years from the effective date of EPA's Final Designation (2013)



Concurrent SIPs

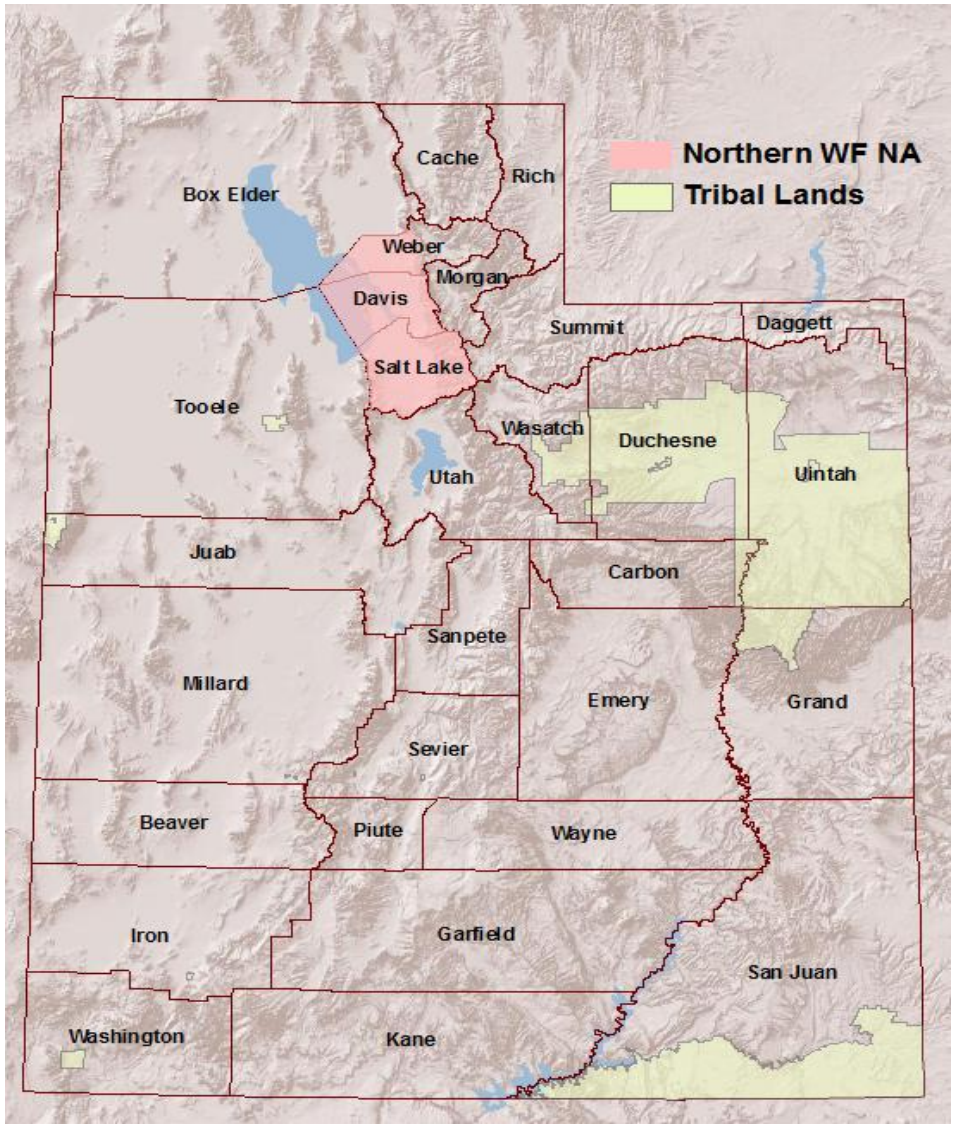
- Development of Ozone SIPs will Overlap with the development of $PM_{2.5}$ SIPs
- DAQ may need to consider both standards as it develops strategies to deal with each
  - NO_X and VOC common to both pollutants
- Affected Areas also will Overlap

Ozone Area Evaluation



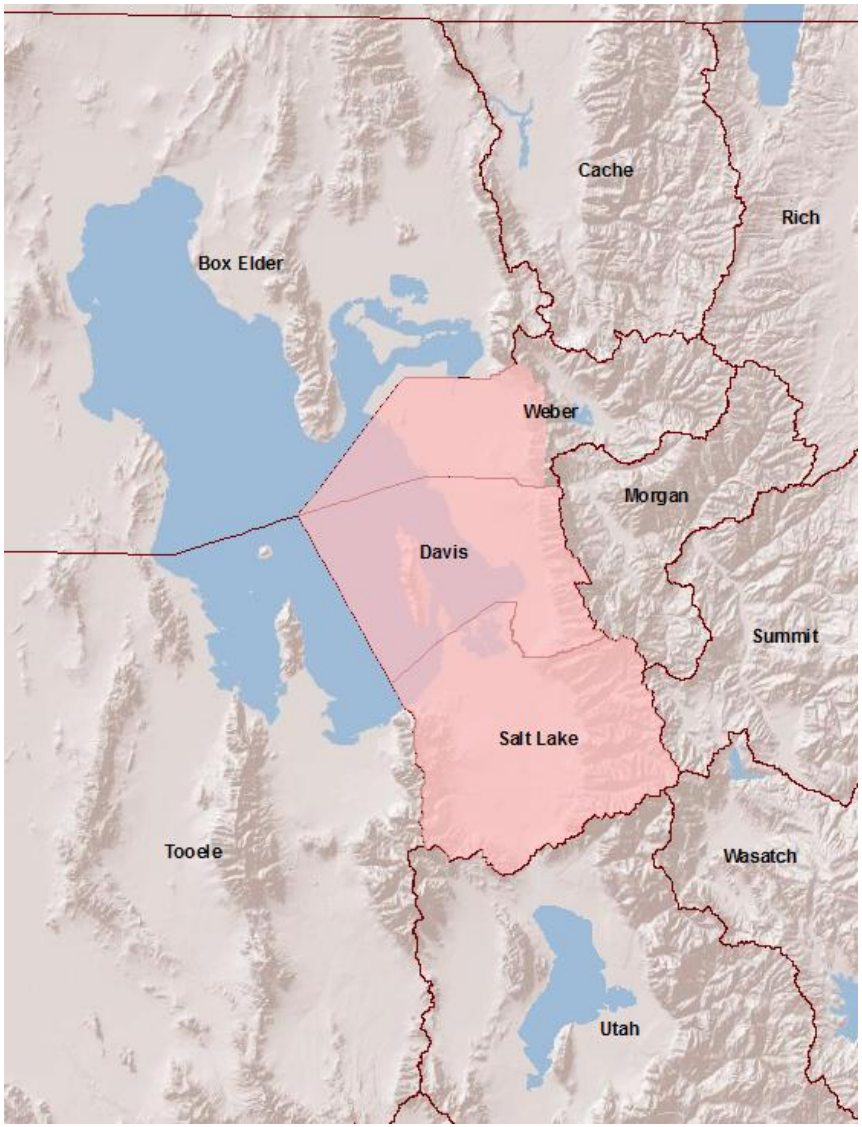
- Utah is evaluating nine factors to determine appropriate area boundaries
- Rather than presuming MSA or CSA boundaries, Utah is considering
  - county boundaries or
  - townships boundaries
- This will provide a higher degree of resolution.

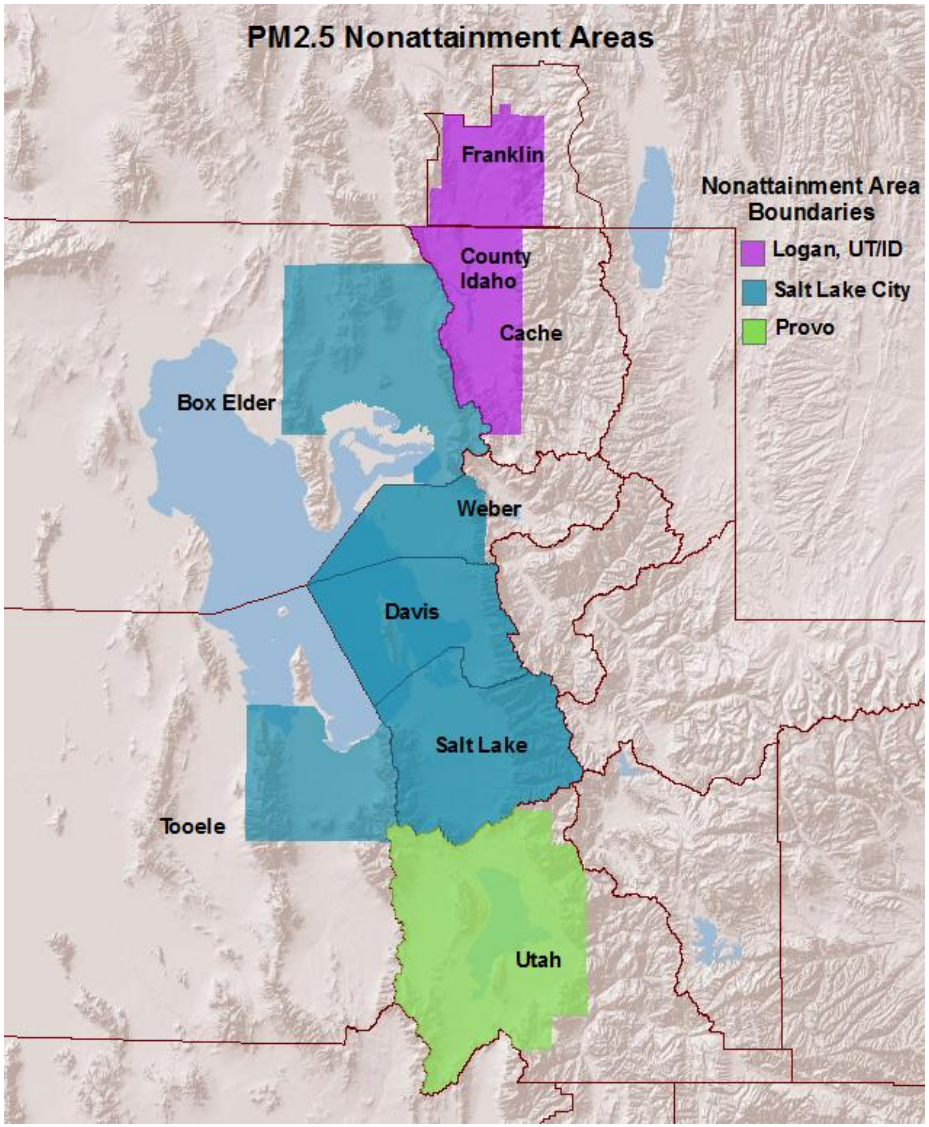
Utah's Draft Recommendation



- All other areas of Utah will probably be recommended as
  - Attainment
    or
  - Unclassifiable
- States do not make recommendations concerning Tribal Lands

Ozone and PM2.5 Areas





PM2.5 Project Organization

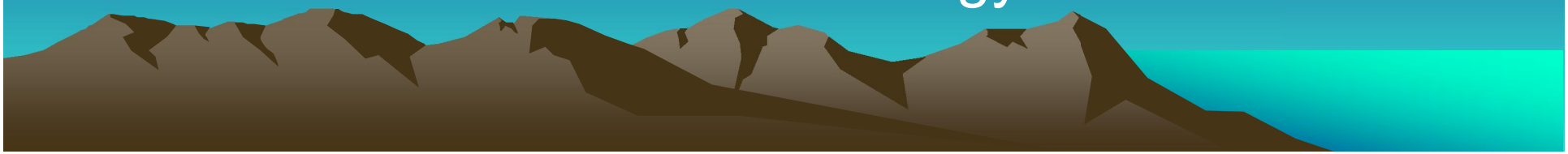
- Intermediate Work Products
  - Validated Air Quality Model
  - Modeled Attainment Demonstration
  - Administrative Elements
- Discussed further in the Following Slides

Validate the Air Quality Model

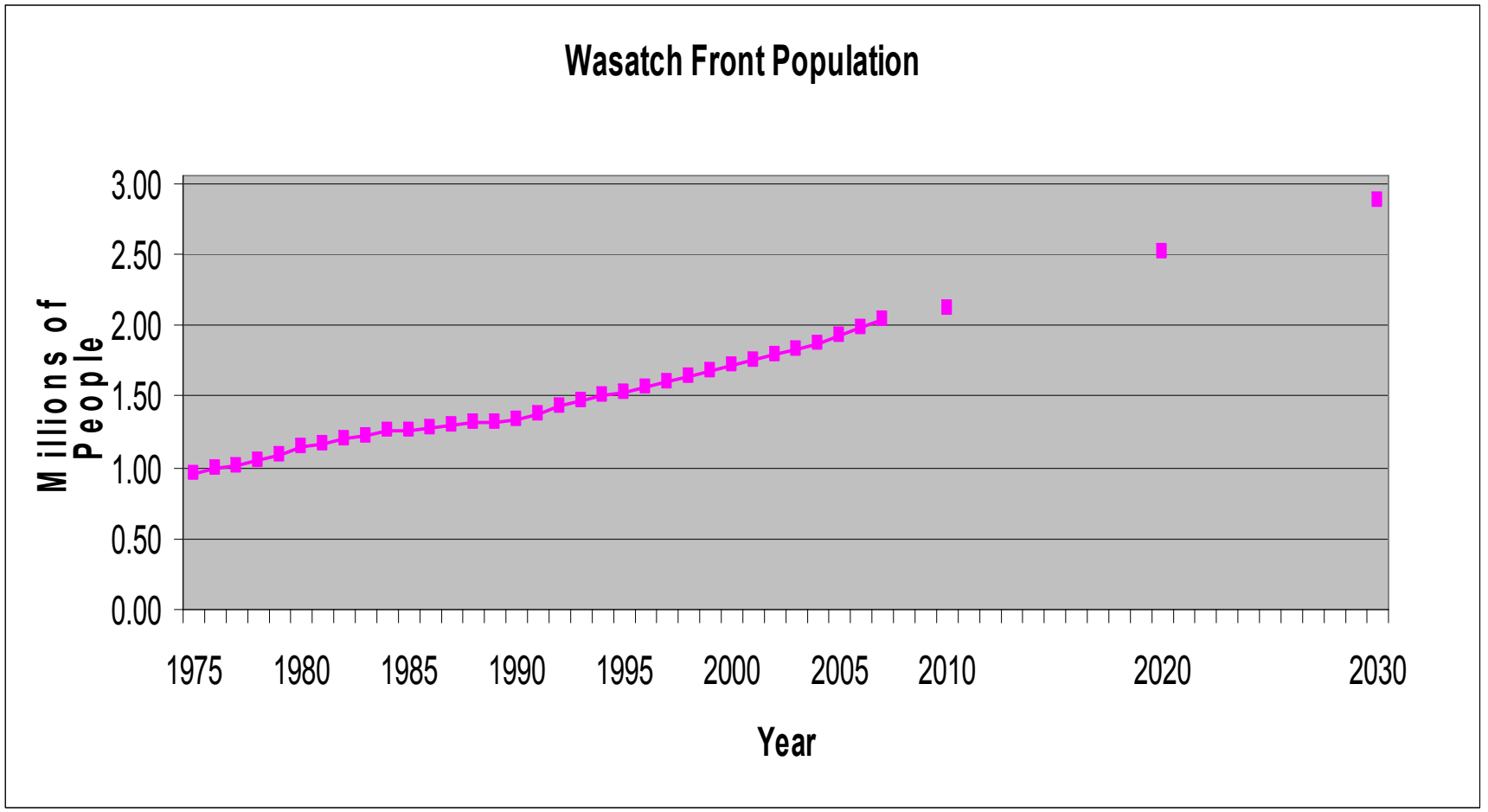
- Regional scale model (CMAQ) with chemistry to consider secondary PM2.5
  - Modeling domain includes all nonattainment areas
  - May also use a Box Model in Cache Valley
- Requires the following input data
  - Emissions inventories
  - Meteorological data
  - Atmospheric chemistry
- Model performance
  - Select past episodes with high ambient concentrations
  - Compare model output to measured data

Modeled Attainment Demonstration

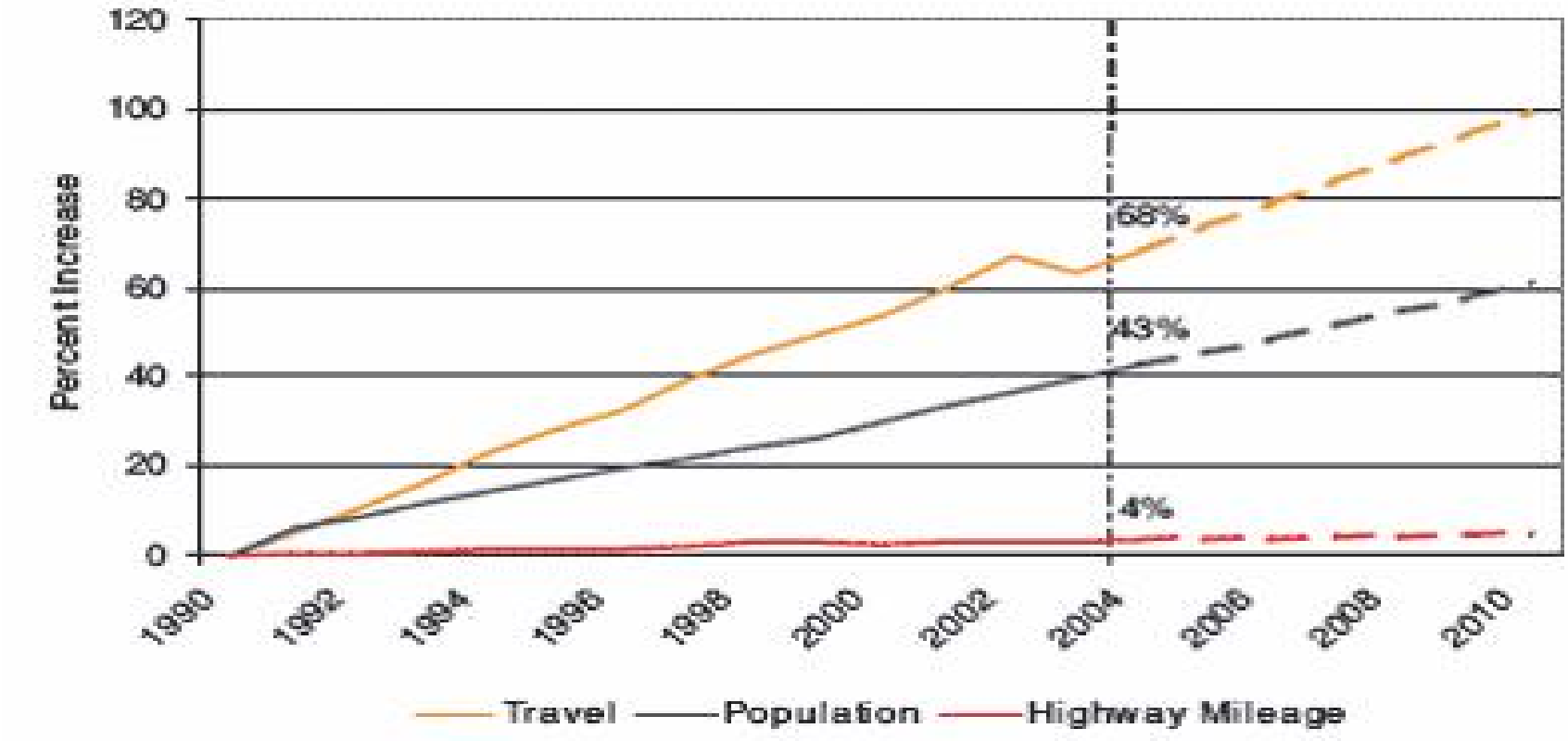
- Must have validated AQ model
- Identify where we were already headed
  - Consider Existing Emission Rates
  - Growth Projections
- Target where we Need to Go
  - Identify and Test Additional Control Strategies
  - Combine into Overall Strategy



Population Projections



Growth in Vehicle Miles Traveled (vmt) Exceeds the Rate of Population Growth (source UDOT)



Modeled Attainment Demonstration

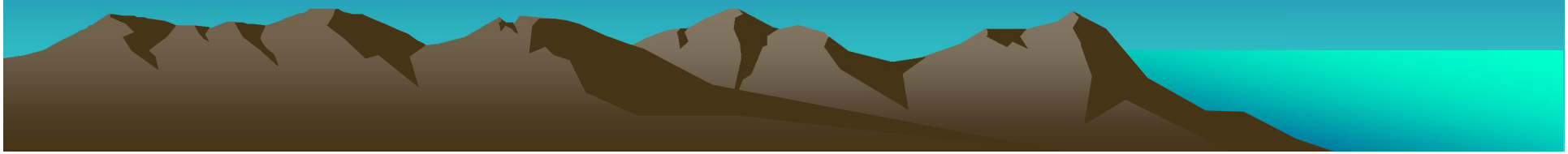
- Model predicts relative response in PM2.5 concentrations, resulting from applied controls
- Responses are applied to calculated Design Values
  - Design Values could change with new monitoring data
- Must show Attainment of the NAAQS

Design Values (unofficial)

Location	County	3-Year Average of 98th Percentiles						
		00 - 02	01 - 03	02 - 04	03 - 05	04 - 06	05 - 07	06 - 08
Logan	Cache	55	54	64	63	63	40	36
Brigham City	Box Elder	43	40	43	35	35	29	35
Ogden	Weber		51	50	40	39	35	40
Bountiful	Davis				40	38	38	35
Hawthorn	Salt Lake	58	52	51	47	48	48	46
Tooele	Tooele						31	22
Lindon	Utah	46	45	45	43	44	45	44

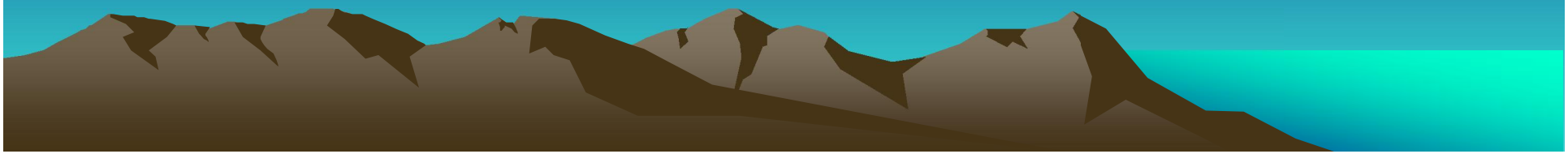
Administrative Elements

- **Compile the SIPs**… Basic Elements would include
  - Modeled Attainment Demonstration
  - Control Strategies (RACT / RACM)
  - Emission Limits
  - Transportation Conformity Budgets
  - Contingency Measures
- **Associated Rulemakings**… Could Include
  - Woodburning rules
  - I/M programs
  - Fugitive Dust rules
  - Condensable emissions testing



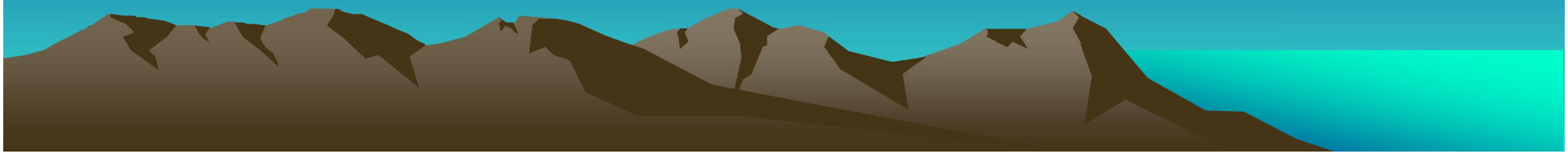
Administrative Elements

- **Technical Documentation**
  - All technical work, as well as any pertinent assumptions, must be documented
- **Public Process**
  - Hold public hearings – gather comments
  - Develop responses to comments
  - Make appropriate revisions



Communications

- Mailing List
  - A work in progress
  - Will become a Listserv
- Web Page
  - Also a work in progress
  - From our Home Page
    - Public Interest
    - Current Issues
    - "$PM_{2.5}$ SIP Development"
  - Will include Listserv access
  - Will include this presentation



Next Steps

- Project has just begun
  - Will take about 3 years
- Work is already underway
  - Episode Selection (maybe even a new one)
  - Episodic Emissions Inventories
  - Assimilation of representative Meteorological Data
- We will likely re-convene when we have a Validated AQ Model

Let’s Clear the Air